Executive Engineer,
Yelahanka Division,
Bruhat Bengaluru Mahanagara Palike

Quality Control Reports

(SECOND and PART)

Name of the Package:

Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)

AGENCY: Sri. Srinivasa Reddy H

Estimate Cost: 1000.00 Lakhs

Project Management Consultants:
SAPIENCE CONSULTANTS AND ENGINEERS, BANGALORE.
#B9-003, GANGA, Jnanabharathi Enclave, Valagerahalli, Mysore Road Bangalore 560056
Ph: 080-29523634; E-Mail: SAPIENCEBANGALORE@GMAIL.COM

Project Management and Consultancy Services

Summary of Frequencies of Field and Laboratory Tests Conducted

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Wet Mix Macadam

Sl. No.	Test Details	Quantity in m^3	Frequency of Tests	Tests Required	Tests Carried Out
1	Aggregate Impact Value	1813.04	1 Test / 1000 m^3	2	2
2	Combined Flakiness and Elongation Indices		1 Test / 500 m^3	4	4
3	Aggregate Gradation		1 Test / 200 m^3	10	2
4	Atterberg Limits		1 Test / 200 m^3	10	10
5	Density of Compacted Layer		1 Test / 1000 m^2	2	2
6	Rate of Spread of Primer Coat		2 Tests / Day	2	2

SAPIENCE CONSULTANTS ENGINEERS * Bangalore-59

Sapience Consultants and Engineers,

Assistant Engineer

Contractor / Agency

Assistant Executive Engineer
ಸಹಾಯಕ ಕಾರ್ಯನಿರ್ವಾಹಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಜಿ.ಬಿ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Aggregate Impact Value

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Wet Mix Macadam
Material	Coarse Aggregates
Test Method	IS : 2386 (Part - IV) 1963
Source / Location	Plant
Sample No.	1
Date	01.07.2022 and 02.07.2022

Sl. No.	Details	Test No.		Average Aggregate Impact Value
		1	2	
1	Weight of Empty Cylinder (in gms) W1	1967	1967	20.50%
2	Weight of cylinder filled with sample (in gms) W2	2474	2490	
3	Weight of Sample (in gms) = (W2 - W1) W3	507	523	
4	Weight of Sample passing through 2.36mm IS sieve after impact (in gms) W4	107	105	
5	Weight of Sample retained in 2.36mm IS sieve after impact (in gms) W5	400	418	
6	Aggregate Impact Value in Percentage	21.00%	20.00%	

Comments:
→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 30% (MORTH table no.500.16)

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS & ENGINEERS

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ.
ಬ.ಬ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Aggregate Particle Shape

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Wet Mix Macadam
Material	Coarse Aggregates
Test Method	IS 2386(Part I) 1963 (RA 2011)
Source / Location	Plant
Sample No.	3 and 4
Date	01.07.2022 and 02.07.2022

Sl. No.	Test	3	4	Requirements as per MORTH 5th edition table no 500.16
1	Flakiness Index	12.80	14.30	Maximum allowable Combined Flakiness and Elongation Indices for Dense Graded Bituminous Macadam is 35% as per Table 500.8 MORTH Specification.
2	Elongation Index	12.60	13.30	
3	Combined Flakiness & Elongation index	25.40	27.60	

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS & ENGINEERS Bangalore-59

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಜ ಜ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Aggregate Gradation

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Wet Mix Macadam
Material	Coarse Aggregates
Test Method	IS 2386(Part 1) 1963 (RA 2011)
Source / Location	Plant
Sample No.	1 & 2
Date	01.07.2022 and 02.07.2022

Total Weight of Sample (gms) : 15000.00

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained (gm)	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
53	0	0	0	100	100	Gradation satisfies the MORTH Table 400-13 Specification for Wet Mix Macadam
45	307.3	307.3	2.05	97.95	95 - 100	
22.4	4303.4	4610.7	30.74	69.26	60 - 80	
11.2	3185.7	7796.4	51.98	48.02	40 - 60	
4.75	2251.3	10047.7	66.98	33.02	25 - 40	
2.36	1114.1	11161.8	74.41	25.59	15 - 30	
0.60	1738.6	12900.4	86.00	14	8 - 22	
0.075	1927.1	14827.5	98.85	1.15	0 - 5	

Total Weight of Sample (gms) : 15000.00

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained (gm)	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
53	0	0	0	100	100	Gradation satisfies the MORTH Table 400-13 Specification for Wet Mix Macadam
45	749.8	749.8	5.00	95.00	95 - 100	
22.4	3447.2	4197.0	27.98	72.02	60 - 80	
11.2	3100.1	7297.1	48.65	51.35	40 - 60	
4.75	2822.6	10119.7	67.46	32.54	25 - 40	
2.36	2168.0	12287.7	81.92	18.08	15 - 30	
0.60	804.4	13092.1	87.28	12.72	8 - 22	
0.075	1716.8	14808.9	98.73	1.27	0 - 5	

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS & ENGINEERS * Bangalore-59

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಧಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ.
ಜ ಟಿ.ಎಂ.ಸಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Aggregate Gradation

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Wet Mix Macadam
Material	Coarse Aggregates
Test Method	IS 2386(Part 1) 1963 (RA 2011)
Source / Location	Plant
Sample No.	3 & 4
Date	01.07.2022 and 02.07.2022

Total Weight of Sample (gms) : 15000.00

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained (gm)	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
53	0	0	0	100	100	Gradation satisfies the MORTH Table 400-13 Specification for Wet Mix Macadam
45	549.9	549.9	3.67	96.33	95 - 100	
22.4	3890.2	4440.1	29.60	70.4	60 - 80	
11.2	3181.0	7621.1	50.81	49.19	40 - 60	
4.75	2390.4	10011.5	66.74	33.26	25 - 40	
2.36	1927.8	11939.3	79.60	20.4	15 - 30	
0.60	702.3	12641.6	84.28	15.72	8 - 22	
0.075	2030.5	14672.1	97.81	2.19	0 - 5	

Total Weight of Sample (gms) : 15000.00

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained (gm)	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
53	0	0	0	100	100	Gradation satisfies the MORTH Table 400-13 Specification for Wet Mix Macadam
45	643.8	643.8	4.29	95.71	95 - 100	
22.4	4382.6	5026.4	33.51	66.49	60 - 80	
11.2	2448.9	7475.3	49.84	50.16	40 - 60	
4.75	2521.9	9997.2	66.65	33.35	25 - 40	
2.36	2033.7	12030.9	80.21	19.79	15 - 30	
0.60	966.8	12997.7	86.65	13.35	8 - 22	
0.075	1827.0	14824.7	98.83	1.17	0 - 5	

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS & ENGINEERS Bangalore-59

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ.
ಜಿ.ಬಿ.ಎ.ಎ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Aggregate Gradation

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Wet Mix Macadam
Material	Coarse Aggregates
Test Method	IS 2386(Part 1) 1963 (RA 2011)
Source / Location	Plant
Sample No.	7 & 8
Date	01.07.2022 and 02.07.2022

Total Weight of Sample (gms) : 15000.00

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained (gm)	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
53	0	0	0	100	100	Gradation satisfies the MORTH Table 400-13 Specification for Wet Mix Macadam
45	698.5	698.5	4.66	95.34	95 - 100	
22.4	3585.5	4284.0	28.56	71.44	60 - 80	
11.2	2993.0	7277.0	48.51	51.49	40 - 60	
4.75	2851.8	10128.8	67.53	32.47	25 - 40	
2.36	1102.4	11231.2	74.87	25.13	15 - 30	
0.60	1273.6	12504.8	83.37	16.63	8 - 22	
0.075	2112.0	14616.8	97.45	2.55	0 - 5	

Total Weight of Sample (gms) : 15000.00

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained (gm)	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
53	0	0	0	100	100	Gradation satisfies the MORTH Table 400-13 Specification for Wet Mix Macadam
45	313.7	313.7	2.09	97.91	95 - 100	
22.4	4196.6	4510.3	30.07	69.93	60 - 80	
11.2	3056.4	7566.7	50.44	49.56	40 - 60	
4.75	2779.5	10346.2	68.97	31.03	25 - 40	
2.36	1207.3	11553.5	77.02	22.98	15 - 30	
0.60	1061.5	12615.0	84.10	15.90	8 - 22	
0.075	2230.9	14845.9	98.97	1.03	0 - 5	

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS & ENGINEERS Bangalore-59

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಬ ಮ.ಎಂ.ಪ. ಬೆಂಗಳೂರು-10೮

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Atterberg Limits

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Wet Mix Macadam
Material	Coarse Aggregates
Test Method	IS 2720(Part 5):1985
Source / Location	Plant
Sample No.	4, 5 and 6
Date	01.07.2022 and 02.07.2022

Sl. No	Description	Test #4	Test #5	Test #6	IS Specifications
1	Liquid Limit, %	21.47	22.07	22.94	-
2	Plasticity Index, %	Non Plastic	Non Plastic	Non Plastic	6.0% Maximum.

Sl. No	Description	Test #10	Test #11	Test #12	IS Specifications
1	Liquid Limit, %	21.01	21.92	21.2	-
2	Plasticity Index, %	Non Plastic	Non Plastic	Non Plastic	6.0% Maximum.

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS & ENGINEERS Bangalore-59

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ
ಬಿ.ಬಿ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Atterberg Limits

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Wet Mix Macadam
Material	Coarse Aggregates
Test Method	IS 2720(Part 5):1985
Source / Location	Plant
Sample No.	7, 8 and 9
Date	01.07.2022 and 02.07.2022

Sl. No	Description	Test #7	Test #8	Test #9	IS Specifications
1	Liquid Limit, %	22.03	22.33	21.44	-
2	Plasticity Index, %	Non Plastic	Non Plastic	Non Plastic	6.0% Maximum.

Sl. No	Description	Test #16	Test #17	Test #18	IS Specifications
1	Liquid Limit, %	22.89	22.07	22.88	-
2	Plasticity Index, %	Non Plastic	Non Plastic	Non Plastic	6.0% Maximum.

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS & ENGINEERS Bangalore-56

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ.
ಜ ಬಿ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Rate of Spread of Prime Coat

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Bituminous Concrete
Material	S. S. Bitumen Emulsion
Test Method	AASHTO T 164 & AASHTO T 30
Source / Location	Site
Sample No.	1 & 2
Date	18.07.2022

Sl. No.	Description	Unit	Test #1		Test #2	
			Tray - 1	Tray - 2	Tray - 1	Tray - 2
1	Size of Plate (mxn)	m^2	0.45 x 0.45	0.45 x 0.45	0.45 x 0.45	0.45 x 0.45
2	Area of the Plate (a)	m^2	0.2025	0.2025	0.2025	0.2025
3	Initial weight of the empty plate (b)	kg	1.627	1.646	1.627	1.646
4	Final weight of plate after application of Prime Coat C	kg	1.753	1.771	1.752	1.769
5	Weight of Primer Coat (d = c-b)	kg	0.126	0.125	0.125	0.123
6	Rate of Spread (d/a)	kg / m^2	0.620	0.620	0.620	0.610
7	Average	kg / m^2	0.620		0.615	
8	Specified Limit	kg / m^2	Not Less than 0.6 kg / m^2			

For Sapience Consultants and Engineers,

SCIENCE CONSULTANTS & ENGINEERS Bangalore-59

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಬಿ.ಬಿ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Quality of Binder

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Dense Bituminous Concrete
Material	VG-30 grade Bitumen
Source / Location	Plant
Date	15.07.2022 - 16.07.2022

The results of the tests conducted on the bitumen sample using for VG-30 Bitumen

Sl. No	Description	Test #1	Test #2	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	58	62	50 - 70
2	Softening point, ^{0}C	57.8	58.1	> 47
3	Specific Gravity	1.4	1.1	Min 0.97
4	Ductility at 25^{0}C, cm	98	98	> 40
5	Flash Point, ^{0}C	322	319	> 220

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS & ENGINEERS Bangalore-59

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ.
ಬಿ.ಬಿ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Aggregate Stripping Value

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Dense Bituminous Macadam
Material	VG-30 grade Bitumen
Test Method	IS : 6241 - 1974 & Specification for Road & Bridge Works, MORTH, Revision - V
Type of binder	VG-30 grade Bitumen
% of Binder Used	4.50 % by weight
Weight of Aggregate	500 gms
Weight of Binder	22.50 gms
Water Bath Temp.	40^0 C
Source / Location	Plant
Sample No.	1
Date	15.07.2022 - 16.07.2022

Observation No	Stripping Percentage	Average Percentage	Average Retained Coating (%)
1	3.44	3.61	97.57
2	3.80		
3	3.60		

Comments: Minimum Allowable Aggregate Stripping Value for Bituminous Concrete is 95%

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS ENGINEERS * Bangalore-59

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಜ.ಬಿ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Specific Gravity and Water Absorption

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Dense Bituminous Macadam
Material	Coarse Aggregates
Test Method	IS 2386(Part 3):1963
Source / Location	Plant
Sample No.	1
Date	15.07.2022 - 16.07.2022

Sl. No.	Description	Notion	Test #1	Test #2	Test #3	Mean Value
1	Weight of aggregate suspended in water with the basket	W_1 g	2020	2024	2023	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1265	1269	1268	
4	Weight of saturated surface dry aggregate in air	W_3 g	2009	2014	2013	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_5)$ g	744	745	745	
6	Weight of oven dried aggregate	W_4 g	1996	2005	2003	
7	Specific Gravity	$W_4/(W_3-W_5)$	2.683	2.691	2.689	2.69
8	Apparent Specific Gravity	$W_4/(W_4-W_5)$	2.731	2.724	2.725	2.73
9	Water Absorption	$((W_3 - W_4) * 100)/W_4$	0.65%	0.45%	0.50%	0.53%

Comments:

→ Maximum allowable Aggregate Water absorption value for Dense Bituminous Macadam is 2.0% (MORTH table 500.16)

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS & ENGINEERS Bangalore 56

Authorized Signatory

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಬಿ.ಬಿ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Aggregate Impact Value

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Dense Bituminous Macadam
Material	Coarse Aggregates
Test Method	IS : 2386 (Part - IV) 1963
Source / Location	Plant
Sample No.	2
Date	15.07.2022 - 16.07.2022

Sl. No.	Details	Test No.		Average Aggregate Impact Value
		3	4	
1	Weight of Empty Cylinder (in gms) W1	868	868	20.00%
	Weight of cylinder filled with sample (in gms) W2	1154	1154	
2	Weight of Sample (in gms) = (W2 - W1) W3	286	286	
	Weight of Sample passing through 2.36mm IS sieve after impact (in gms) W4	53	60	
	Weight of Sample retained in 2.36mm IS sieve after impact (in gms) W5	233	226	
3	Aggregate Impact Value in Percentage	19.00%	21.00%	

Comments:
→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 27% (MORTH table no.500.16)

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS & ENGINEERS Bangalore

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಬ.ಜ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Aggregate Gradation

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Dense Bituminous Macadam
Material	Coarse Aggregates
Test Method	IS 2386(Part 1) 1963 (RA 2011)
Source / Location	Plant
Sample No.	1 & 2
Date	18.07.2022

Total Weight of Sample (gms) : 10000.00

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained (gm)	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
37.50	0	0	0	100	100	Gradation satisfies the MORTH Grade-II Specification for Dense Bituminous Macadam
26.50	397.1	397.1	3.97	96.03	95 - 100	
19.00	2161.6	2558.7	25.59	74.41	60 - 80	
13.20	2502.6	5061.3	50.61	49.39	40 - 60	
4.75	1272.2	6333.5	63.34	36.66	25 - 40	
2.36	1761.2	8094.7	80.95	19.05	15 - 30	
0.300	-81.0	8013.7	80.14	19.86	8 - 22	
0.075	1605.6	9619.3	96.19	3.81	0 - 5	

Total Weight of Sample (gms) : 10000.00

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained (gm)	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
37.50	0	0	0	100	100	Gradation satisfies the MORTH Grade-II Specification for Dense Bituminous Macadam
26.50	362.9	362.9	3.63	96.37	95 - 100	
19.00	2457.4	2820.3	28.20	71.80	60 - 80	
13.20	1675.9	4496.2	44.96	55.04	40 - 60	
4.75	2386.8	6883.0	68.83	31.17	25 - 40	
2.36	651.5	7534.5	75.35	24.65	15 - 30	
0.300	1286.6	8821.1	88.21	11.79	8 - 22	
0.075	978.7	9799.8	98.00	2.00	0 - 5	

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS Bangalore-56 ENGINEERS

Authorized Signature

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Rate of Spread of Tack Coat

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	80/100 grade bitumen(VG10)
Material	Tack Coat
Test Method	AASHTO T 164 & AASHTO T 30
Source / Location	Site
Sample No.	3 & 4
Date	20.07.2022

Sl. No.	Description	Unit	Test #3		Test #4	
			Tray - 1	Tray - 2	Tray - 1	Tray - 2
1	Size of Plate (mxn)	m^2	0.3 x 0.3	0.3 x 0.3	0.3 x 0.3	0.3 x 0.3
2	Area of the Plate (a)	m^2	0.09	0.09	0.09	0.09
3	Initial weight of the empty plate (b)	kg	2.787	2.853	2.787	2.853
4	Final weight of plate after application of Tack Coat C	kg	2.811	2.876	2.811	2.876
5	Weight of Tack Coat (d = c-b)	kg	0.024	0.023	0.024	0.023
6	Rate of Spread (d/a)	kg / m^2	0.27	0.26	0.27	0.26
7	Average	kg / m^2	**0.27**		**0.27**	
8	Specified Limit	kg / m^2	Not Less than 0.25 kg / m^2			

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS & ENGINEERS Bangalore-59

Authorized Signatory

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಬಿ.ಬಿ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Binder Content and Mix Gradation

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO - 12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Srl. Sreenivasa Reddy
Mix Type	Dense Bituminous Macadam
Material	Dense Bituminous Macadam Mix
Test Method	AASHTO T 164 & AASHTO T 30
Source / Location	Site
Sample No.	1 & 2
Date	19.07.2022

Sl. No.	Description	Test #1	Test #2
1	Weight of mix before extraction = M in gms.	500.00	500.00
2	Wt. of filter paper before extraction =P1 in gms.	4.00	4.00
3	Wt. of filter paper after extraction =P2 in gms.	6.00	5.00
4	Quantity of Dry Aggregates deposited on filter paper a1= P2-P1 in gms.	2.00	1.00
5	Wt. of Dry Aggregates in the extractor container a2 in gms.	**476.00**	**475.00**
6	Total Wt. of Dry Aggregates A = a1+a2 in gms.	478.00	476.00
7	Wt. of Bitumen B= M-A in gms.	22.00	24.00
8	% of Bitumen Content (B/M)x100	4.40	4.80
9	Average	4.60%	

For Sapience Consultants and Engineers,

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಬ.ಬ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Binder Content and Mix Gradation

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO - 12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Dense Bituminous Macadam
Material	Dense Bituminous Macadam Mix
Test Method	AASHTO T 164 & AASHTO T 30
Source / Location	Site
Sample No.	3 & 4
Date	20.07.2022

Sl. No.	Description	Test #1	Test #2
1	Weight of mix before extraction = M in gms.	500.00	500.00
2	Wt. of filter paper before extraction =P1 in gms.	4.00	4.00
3	Wt. of filter paper after extraction =P2 in gms.	6.00	5.00
4	Quantity of Dry Aggregates deposited on filter paper a1= P2-P1 in gms.	2.00	1.00
5	Wt. of Dry Aggregates in the extractor container a2 in gms.	476.00	476.00
6	Total Wt. of Dry Aggregates A = a1+a2 in gms.	478.00	477.00
7	Wt. of Bitumen B= M-A in gms.	22.00	23.00
8	% of Bitumen Content (B/M)x100	4.40	4.60
9	Average	4.50%	

For Sapience Consultants and Engineers,

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ.
ಜ ಜ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

Binder Content and Mix Gradation

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Dense Bituminous Macadam
Material	Coarse Aggregates
Test Method	AASHTO T 164 & AASHTO T 30
Source / Location	Site
Sample No.	3 & 4
Date	20.07.2022

Weight of Sample after test (gms) : **476.00**

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
37.50	0	0	0	100	100	Gradation satisfies the MORTH Grade-II Specification for Dense Bituminous Macadam
26.50	21.1	21.1	4.43	95.57	95 - 100	
19.00	109.4	130.5	27.42	72.58	60 - 80	
13.20	116.6	247.1	51.91	48.09	40 - 60	
4.75	84.3	331.4	69.62	30.38	25 - 40	
2.36	23.2	354.6	74.5	25.50	15 - 30	
0.300	66.4	421.0	88.45	11.55	8 - 22	
0.075	45.4	466.4	97.98	2.02	0 - 5	

Weight of Sample after test (gms) : **476.00**

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
37.50	0	0	0	100	100	Gradation satisfies the MORTH Grade-II Specification for Dense Bituminous Macadam
26.50	19.4	19.4	4.08	95.92	95 - 100	
19.00	119.5	138.9	29.18	70.82	60 - 80	
13.20	97.7	236.6	49.71	50.29	40 - 60	
4.75	90.1	326.7	68.63	31.37	25 - 40	
2.36	19.4	346.1	72.71	27.29	15 - 30	
0.300	73.6	419.7	88.17	11.83	8 - 22	
0.075	37.8	457.5	96.11	3.89	0 - 5	

For Sapience Consultants and Engineers,

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಜ ಜ.ಎಂ.ಕ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

BITUMINOUS CONCRETE

(Mix Design / Job Mix Formula)

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO - 12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Design	Bituminous Concrete (BC)
Date	15.07.2022 - 16.07.2022

Mix Design / Job Mix Formula for Bituminous Concrete is based on clause 507 of MoRTH Specification for Road and Bridge work (5th Revision)

1. Materials Proposed to be used

1	Coarse Aggregate	i) 19.2 mm & down size ii) 13.2 mm and down size
2	Coarse Aggregate	i) 2.36 mm & down size ii) Mineral Filler Cement
3	Bitumen	50 - 70 VG-30 Grade Bitumen

2. Physical requirement of Coarse Aggregate for Bituminous Concrete

Sl. No.	Test	Requirement	Result as per Test	Remarks
1	Grain size analysis	5% max passing 0.075 mm Sieve	4.75%	Physical requirements of Aggregates proposed to be used for BC Conforms to MORTH specifications
2	Flakiness and Elongation Indices (Combined)	< 30%	21%	
3	Aggregate Impact Value	< 24%	27%	
4	Water Absorption Value	< 2%	0.90%	
5	Coating and Stripping of Bitumen Aggregates to Mixtures	Minimum Retained Coating	No Stripping	

SAPIENCE CONSULTANTS ENGINEERS Bangalore

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಜ ಜ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

3. Analysis conducted by Rothfuch's Method

1	12.5 mm & down size	63%	Note: Mix proportions given are for the sample aggregates supplied. Any minor mixing percentage shall be altered during production of BC Mix to ensure graded mix conforming to MORTH specification
2	6 mm & down size	35%	
3	Mineral Filler (Cement)	2%	

Sieve Size in mm	Specified Gradation as per MORTH	Results as per Test		Specified Gradation as per Rothfuch's Method
		Test #1	Test #2	
		Cumulative % by weight of total aggregate passing		
19	100	100	100	100
13.2	90 - 100	96.60	95.46	72 - 100
9.5	70 - 88	79.50	79.18	64 - 94
4.75	53 - 71	60.01	62.23	48 - 76
2.36	42 - 58	52.76	50.75	38 - 62
1.18	34 - 48	41.18	41.73	31 - 51
0.600	26 - 38	31.63	31.70	22 - 42
0.300	18 - 28	24.51	22.81	15 - 31
0.150	12 - 20	16.56	16.62	9 - 21
0.075	4 - 10	6.51	7.71	2.5 - 11.5

4. Bitumen Content

Minimum 4.97% binder content shall be ensured during production of BC mix material

5. Degree of Compaction to be achieved in the Field

Degree of compaction should be minimum 2.35 g/cc

6. Bitumen test (VG- 30 50/70 Paving Grade to be used)

Sl. No	Description	Specification	Result as Test	Methods of test Ref. to IS
1	Penetration at 25 ^{0}C, 1/10 mm	50 - 70	63	IS 1203
2	Softening point, ^{0}C	> 47	59.1	IS 1205
3	Specific Gravity	Min 0.97	1.3	Min 0.97
4	Ductility at 25^{0}C, cm	> 40	98	IS 1208
5	Flash Point, ^{0}C	> 220	320	IS 1209

SAPIENCE CONSULTANTS ENGINEERS * Bangalore-59

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಜಿ.ಜಿ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Specific Gravity and Water Absorption

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Bituminous Concrete
Material	Coarse Aggregates
Test Method	IS 2386(Part 3):1963
Source / Location	Plant
Sample No.	1
Date	15.07.2022 - 16.07.2022

Sl. No.	Description	Notion	Test #1	Test #2	Test #3	Mean Value
1	Weight of aggregate suspended in water with the basket	W_1 g	2021	2019	2020	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_3$ g	1266	1264	1265	
4	Weight of saturated surface dry aggregate in air	W_3 g	2011	2010	2009	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_5)$ g	745	746	744	
6	Weight of oven dried aggregate	W_4 g	1997	2001	1997	
7	Specific Gravity	$W_4/(W_3-W_5)$	2.681	2.682	2.684	2.68
8	Apparent Specific Gravity	$W_4/(W_4-W_5)$	2.732	2.715	2.728	2.73
9	Water Absorption	$((W_3 - W_4) * 100)/W_4$	0.70%	0.45%	0.60%	0.58%

Comments:
→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%
(MORTH table 500.16)

For Sapience Consultants and Engineers,

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಜ.ಜ.ಎ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Aggregate Impact Value

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Bituminous Concrete
Material	Coarse Aggregates
Test Method	IS : 2386 (Part - IV) 1963
Source / Location	Plant
Sample No.	1
Date	15.07.2022 - 16.07.2022

Sl. No.	Details	Test No.		Average Aggregate Impact Value
		1	2	
1	Weight of Empty Cylinder (in gms) W1	868	868	14.00%
	Weight of cylinder filled with sample (in gms) W2	1178	1155	
2	Weight of Sample (in gms) = (W2 - W1) W3	310	287	
	Weight of Sample passing through 2.36mm IS sieve after impact (in gms) W4	40	44	
	Weight of Sample retained in 2.36mm IS sieve after impact (in gms) W5	270	243	
3	Aggregate Impact Value in Percentage	13.00%	15.00%	

Comments:
→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%(MORTH table no 500.16)

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS & ENGINEERS Bangalore

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಜಿ.ಬಿ.ಎ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Aggregate Particle Shape

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO - 12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Bituminous Concrete
Material	Coarse Aggregates
Test Method	IS 2386(Part 1) 1963 (RA 2011)
Source / Location	Plant
Sample No.	2
Date	15.07.2022 - 16.07.2022

Sl. No.	Test	1	2	Requirements as per MORTH 5th edition table no 500.16
1	Flakiness Index	11.70	10.80	Combined Flakiness & Elongation index Max 35%
2	Elongation Index	9.70	10.90	
3	Combined Flakiness & Elongation index	21.40	21.70	

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS & ENGINEERS Bangalore-59

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಪಾ.ಇ.ಯ.ಕ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Aggregate Gradation

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Bituminous Concrete
Material	Coarse Aggregates
Test Method	IS 2386(Part 1) 1963 (RA 2011)
Source / Location	Plant
Sample No.	1 & 2
Date	21/07/2022;

Total Weight of Sample (gms) : 5000.00

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained (gm)	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
19	0	0	0	100	100	Gradation satisfies the MORTH Grade-II Specification for Bituminous Concrete
13.2	151.8	151.8	3.04	96.96	90 - 100	
9.5	942.3	1094.1	21.88	78.12	70 - 88	
4.75	838.7	1932.8	38.66	61.34	53 - 71	
2.36	523.4	2456.2	49.12	50.88	42 - 58	
1.18	442.1	2898.3	57.97	42.03	34 - 48	
0.600	667.9	3566.2	71.32	28.68	26 - 38	
0.300	404.9	3971.1	79.42	20.58	18 - 28	
0.150	327.4	4298.5	85.97	14.03	12 - 20	
0.075	470.7	4769.2	95.38	4.62	4 - 10	

Total Weight of Sample (gms) : 5000.00

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained (gm)	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
19	0	0	0	100	100	Gradation satisfies the MORTH Grade-II Specification for Bituminous Concrete
13.2	239.5	239.5	4.79	95.21	90 - 100	
9.5	772.7	1012.2	20.24	79.76	70 - 88	
4.75	938.3	1950.5	39.01	60.99	53 - 71	
2.36	578.6	2529.1	50.58	49.42	42 - 58	
1.18	569.7	3098.8	61.98	38.02	34 - 48	
0.600	390.8	3489.6	69.79	30.21	26 - 38	
0.300	224.2	3713.8	74.28	25.72	18 - 28	
0.150	436.9	4150.7	83.01	16.99	12 - 20	
0.075	483.5	4634.2	92.68	7.32	4 - 10	

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS & ENGINEERS Bangalore-59

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಜಿ.ಬಿ.ಎ.ಪಿ. ಬೆಂಗಳೂರು-10

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Aggregate Gradation

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Bituminous Concrete
Material	Coarse Aggregates
Test Method	IS 2386(Part 1) 1963 (RA 2011)
Source / Location	Plant
Sample No.	3 & 4
Date	22/07/2022

Total Weight of Sample (gms) : 5000.00

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained (gm)	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
19	0	0	0	100	100	Gradation satisfies the MORTH Grade-II Specification for Bituminous Concrete
13.2	283.5	283.5	5.67	94.33	90 - 100	
9.5	804.5	1088.0	21.76	78.24	70 - 88	
4.75	998.9	2086.9	41.74	58.26	53 - 71	
2.36	596.5	2683.4	53.67	46.33	42 - 58	
1.18	401.9	3085.3	61.71	38.29	34 - 48	
0.600	380.5	3465.8	69.32	30.68	26 - 38	
0.300	428.7	3894.5	77.89	22.11	18 - 28	
0.150	394.6	4289.1	85.78	14.22	12 - 20	
0.075	410.2	4699.3	93.99	6.01	4 - 10	

Total Weight of Sample (gms) : 5000.00

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained (gm)	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
19	0	0	0	100	100	Gradation satisfies the MORTH Grade-II Specification for Bituminous Concrete
13.2	278.6	278.6	5.57	94.43	90 - 100	
9.5	821.5	1100.1	22.00	78.00	70 - 88	
4.75	997.9	2098.0	41.96	58.04	53 - 71	
2.36	481.1	2579.1	51.58	48.42	42 - 58	
1.18	491.3	3070.4	61.41	38.59	34 - 48	
0.600	409.5	3479.9	69.60	30.40	26 - 38	
0.300	340.3	3820.2	76.40	23.60	18 - 28	
0.150	515.9	4336.1	86.72	13.28	12 - 20	
0.075	339.6	4675.7	93.51	6.49	4 - 10	

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS AND ENGINEERS Bangalore-59

Authorized Signature

ಕರ್ನಾಟಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಬಿ.ಬಿ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-೧೧೯

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Marshall Stability

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Bituminous Concrete
Material	Coarse Aggregates
Test Method	IS 2386(Part 3):1963
Source / Location	Plant
Sample No.	1 & 2
Date	21/07/2022;

Sl. No.	Properties	Test #1	Test #2	Requirement as per MORTH (Table 500-19)
1	Marshall Stability value at 600C in KGs	1316.00	1314.00	> 900
2	Marshal flow, mm	2.43	3.47	2 - 4
3	Percent air voids in Mineral Aggregate	3.37	4.99	13 - 15
4	Voids in Compacted Mix	5.88	4.04	3 - 6
5	Percent voids in mineral aggregate (VMA)	11.29	11.00	11 - 13
6	Density, g/cc	3.05	2.34	---

For Sapience Consultants and Engineers,

SAPIENCE CONSULTANTS Bangalore-56

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಬಿ.ಬಿ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Binder Content and Mix Gradation

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12)
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Bituminous Concrete
Material	Bituminous Concrete Mix
Test Method	AASHTO T 164 & AASHTO T 30
Source / Location	Site
Sample No.	1 & 2
Date	21/07/2022;

Sl. No.	Description	Test #1	Test #2
1	Weight of mix before extraction = M in gms.	500.00	500.00
2	Wt. of filter paper before extraction =P1 in gms.	4.00	4.00
3	Wt. of filter paper after extraction =P2 in gms.	5.00	4.00
4	Quantity of Dry Aggregates deposited on filter paper a1= P2-P1 in gms.	1.00	0.00
5	Wt. of Dry Aggregates in the extractor container a2 in gms.	**472.00**	**471.00**
6	Total Wt. of Dry Aggregates A = a1+a2 in gms.	473.00	471.00
7	Wt. of Bitumen B= M-A in gms.	27.00	29.00
8	% of Bitumen Content (B/M)x100	5.40	5.80

For Sapience Consultants and Engineers,

Authorized Signatory

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಬ.ಬ.ಎಂ.ಪಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Binder Content and Mix Gradation

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Bituminous Concrete
Material	Bituminous Concrete Mix
Test Method	AASHTO T 164 & AASHTO T 30
Source / Location	Site
Sample No.	3 & 4
Date	22/07/2022

Sl. No.	Description	Test #3	Test #4
1	Weight of mix before extraction = M in gms.	500.00	500.00
2	Wt. of filter paper before extraction =P1 in gms.	4.00	4.00
3	Wt. of filter paper after extraction =P2 in gms.	5.00	5.00
4	Quantity of Dry Aggregates deposited on filter paper a1= P2 P1 in gms.	1.00	1.00
5	Wt. of Dry Aggregates in the extractor container a2 in gms.	471.00	472.00
6	Total Wt. of Dry Aggregates A = a1+a2 in gms.	472.00	473.00
7	Wt. of Bitumen B= M-A in gms.	28.00	27.00
8	% of Bitumen Content (B/M)x100	5.60	5.40

For Sapience Consultants and Engineers,

Authorized Signature

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ
ಜ ಜ.ಎ.ಕಿ. ಬೆಂಗಳೂರು-106

sapience
Consultants and Engineers
(Building, Geo-Tech & Road Materials Testing Laboratory)

#B9-003, GANGA, Jnanabharathi Enclave,
Valagerahalli, Mysore Road, Bangalore 560059
Ph: 9448853634, 8762194386.
Email: sapiencebangalore@gmail.com

Binder Content and Mix Gradation

Project Name	Restoration and Improvements of Roads from Doddaballapura Main Road to Nagarjuna College, Kaveri Layout, Chowdappa Layout, Maruthinagara, Hariraja Layout and Surrounding Areas in Ward No - 03 of Yelahanka New Town Sub Division (PACKAGE NO -12
Client	Executive Engineer, Yelahanka Division, BBMP, Bangalore.
Job No.:	SCE/PMC/QCR-2/BBMP/YHK/2022-23/61 Dt. 03/08/2022
Contractor / Agency	Sri. Sreenivasa Reddy
Mix Type	Bituminous Concrete
Material	Coarse Aggregates
Test Method	AASHTO T 164 & AASHTO T 30
Source / Location	Site
Sample No.	3 & 4
Date	22/07/2022

Weight of Sample after test (gms) : **471.00**

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
19	0	0	0	100	100	Gradation satisfies the MORTH Grade-II Specification for Bituminous Concrete
13.2	25.7	25.7	5.46	94.54	90 - 100	
9.5	91.0	116.7	24.78	75.22	70 - 88	
4.75	53.5	170.2	36.14	63.86	53 - 71	
2.36	75.8	246.0	52.23	47.77	42 - 58	
1.18	29.3	275.3	58.45	41.55	34 - 48	
0.600	41.2	316.5	67.2	32.8	26 - 38	
0.300	50.1	366.6	77.83	22.17	18 - 28	
0.150	29.5	396.1	84.1	15.9	12 - 20	
0.075	53.9	450.0	95.54	4.46	4 - 10	

Weight of Sample after test (gms) : **472.00**

Sieve Size (mm)	Weight Retained in gms	Cumulative Weight Retained	Cummulative % Retained	Cumulative % Passing	Requirement as per MORTH table 500.17	Remarks
19	0	0	0	100	100	Gradation satisfies the MORTH Grade-II Specification for Bituminous Concrete
13.2	20.4	20.4	4.32	95.68	90 - 100	
9.5	94.2	114.6	24.28	75.72	70 - 88	
4.75	70.9	185.5	39.30	60.70	53 - 71	
2.36	52.3	237.8	50.38	49.62	42 - 58	
1.18	46.7	284.5	60.28	39.72	34 - 48	
0.600	44.3	328.8	69.66	30.34	26 - 38	
0.300	30.8	359.6	76.19	23.81	18 - 28	
0.150	35.7	395.3	83.75	16.25	12 - 20	
0.075	46.5	441.8	93.60	6.40	4 - 10	

For Sapience Consultants and Engineers,

Authorized Signatory

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಯಲಹಂಕ ಉಪನಗರ ಉಪವಿಭಾಗ,
ಜ.ಪಾ.ಇ.ಪಿ. ಬೆಂಗಳೂರು-10